AMENDMENTS TO THE CLAIMS

1-46. (Cancelled)

47. (New) A biochip assembly for a cell based assay comprising:

a plurality of biochips, each biochip comprising at least one elongate microchannel,

an inlet port adjacent one end of each microchannel,

an outlet port adjacent the other end of each microchannel;

a liquid delivery unit having a plurality of liquid delivery ports, one for connection to each biochip;

at least one fluidly separate reservoir well for use with each biochip; and

releasable connection means for each port and well for reception of removable separate enclosed transfer conduits for releasable fluidic connection of some of the ports to other of the ports and wells.

48. (New) A biochip assembly for a cell based assay comprising:

a plurality of biochips, each biochip comprising at least one elongate microchannel,

an inlet port adjacent one end of each microchannel and an outlet port adjacent the other end of each microchannel;

a liquid delivery unit having at least one liquid delivery port for connection to each biochip;

two sets of at least two fluidly separate reservoir wells, one adjacent the inlet port and the other adjacent the outlet port of each biochip; and

releasable connection means for each port and well for reception of removable separate enclosed transfer conduits for releasable fluidic connection of some of the ports to other of the ports and wells.

49. (New) A biochip assembly for a cell based assay comprising:

a plurality of biochips, each biochip comprising at least one elongate microchannel, an inlet port adjacent one end of each microchannel and an outlet port adjacent the other end of each microchannel;

a liquid delivery unit having a plurality of liquid delivery ports, one for connection to each biochip,

at least one fluidly separate reservoir well for use with each biochip; and

a plurality of removable separate enclosed transfer conduits for releasable fluidic connection of some of the ports to other of the ports and wells.

50. (New) The biochip assembly as claimed in claim 49, in which each biochip has more than one inlet port, each of which is for connection to a different liquid delivery unit.

51. (New) The biochip assembly as claimed in claim 49, in which each biochip has more than one outlet port.

52. (New) The biochip assembly as claimed in claim 49, in which the biochip comprises a pair of elongate microchannels, each having at least one inlet port at its proximal

end and at their distal ends connecting into a further microchannel having at least one outlet port at its distal end to form therewith a Y-shaped composite microchannel.

53. (New) The biochip assembly as claimed in claim 49, in which the biochip comprises at least one elongate microchannel having a bore, at least one intermediate portion of which has a different cross-sectional area to that of the rest of the microchannel.

54. (New) The biochip assembly as claimed in claim 49, in which each biochip comprises a pair of elongate microchannels, each microchannel having at least one inlet port and at least one outlet port, the microchannels being connected their proximal ends and distal ends.

55. (New) A biochip assembly for a cell based assay comprising:

a plurality of biochips, each biochip comprising at least one elongate microchannel, an inlet port adjacent one end of each microchannel and an outlet port adjacent the other end of each microchannel;

a liquid delivery unit having a liquid delivery port for connection to each biochip;

at least one fluidly separate reservoir well for use with each biochip; and

a plurality of removable separate enclosed transfer conduits for releasable fluidic connection of some of the ports to other of the ports and wells, each transfer conduit having an internal cross sectional area substantially greater than that of each microchannel.

56. (New) A biochip assembly for a cell based assay comprising:

a plurality of biochips, each biochip comprising an elongate microchannel, an inlet port adjacent one end of each microchannel and an outlet port adjacent the other end of each microchannel;

a liquid delivery unit having at least one liquid delivery port;

two sets of at least two fluidly separate reservoir wells, one adjacent the inlet port and the other adjacent the outlet port of each biochip; and

a plurality of removable separate enclosed transfer conduits for releasable fluidic connection of some of the ports to other of the ports and wells, each transfer conduit having an internal cross sectional area substantially greater than that of each microchannel.

57. (New) A biochip assembly for a cell based assay comprising:

a planar biochip sheet of translucent material or combination of several materials;

a plurality of biochips, each biochip comprising at least one elongate microchannel formed by open cut-out channels in one bottom face of the biochip sheet covered by a thin film of material or several materials one on top of another;

an inlet port for each microchannel in the top face of the biochip sheet communicating adjacent one end of the microchannel;

an outlet port for each microchannel in the top face of the biochip sheet communicating adjacent the other end of the microchannel;

a fluidly separate reservoir in the top face adjacent each inlet and outlet port;

a liquid delivery unit having a liquid delivery port for connection to each biochip; and

releasable connection means for each port and well for reception of removable separate enclosed transfer conduits for releasable fluidic connection of some of the ports to other of the ports and wells.

58. (New) The biochip assembly as claimed in claim 57, in which the microchannels are of non-cylindrical cross-section.

59. (New) A biochip assembly for a cell based assay comprising:

a planar biochip sheet of translucent material or combination of several materials;

a plurality of biochips, each biochip comprising at least one elongate microchannel formed by open cut-out channels in one bottom face of the biochip sheet covered by a thin film of material or combination of several materials;

an inlet port for each microchannel in the top face of the biochip sheet communicating adjacent one end of the microchannel;

an outlet port for each microchannel in the top face of the biochip sheet communicating adjacent the other end of the microchannel;

a fluidly separate reservoir in the top face adjacent each inlet and outlet port;

a liquid delivery unit having a liquid delivery port;

a main liquid feeder channel comprising an open cut-out liquid channel in the bottom face for connection to the liquid delivery port of the liquid delivery unit and having a plurality of delivery ports in the top face, one for each microchannel and for the feeder channel, the liquid channel being covered by a thin film of material or combination of materials; and

releasable connection means for each port and well for reception of removable separate enclosed transfer conduits for releasable fluidic connection of some of the ports to other of the ports and wells.

60. (New) A biochip assembly for a cell based assay comprising:

a planar biochip sheet of translucent material or combination of several materials;

a plurality of biochips, each biochip comprising at least one elongate microchannel formed by open cut-out channels in one bottom face of the biochip sheet covered by a thin film of material or combination of several materials;

an inlet port for each microchannel in the top face of the biochip sheet communicating adjacent one end of the microchannel;

an outlet port for each microchannel in the top face of the biochip sheet communicating adjacent the other end of the microchannel;

a fluidly separate reservoir in the top face adjacent each inlet and outlet port;

a liquid delivery unit having a liquid delivery port;

an upper support plate having an upper face and a lower face in use;

a plurality of tubes mounted in the plate and projecting proud of the faces, each tube proud of the upper face being for connection to one of the transfer conduits and at its other end for connection to one of the ports and wells; and

releasable connection means for each port and well for reception of removable separate enclosed transfer conduits for releasable fluidic connection of some of the ports to other of the ports and wells.

61. (New) The biochip assembly as claimed in claim 60, in which releasable connection means is provided for mounting the plate above the top face of the biochip sheet in correspondence with ports or wells.

62. (New) A biochip assembly for a cell based assay comprising:

a planar biochip sheet of translucent material or combination of several materials;

a plurality of biochips, each biochip comprising an elongate microchannel formed by open cut-out channels in one bottom face of the biochip sheet covered by a thin film of material or combination of several materials;

an inlet port for each microchannel in the other top face of the biochip sheet communicating adjacent one end of the microchannel;

an outlet port for each microchannel in the top face of the biochip sheet communicating adjacent the other end of the microchannel;

a fluidly separate reservoir in the top face adjacent each inlet and outlet port;

a liquid delivery unit having a liquid delivery port for connection to each biochip;

a main liquid feeder channel comprising an open cut-out liquid channel in the bottom face for connection to the liquid delivery port of the liquid delivery unit and having a plurality of delivery ports in the top face, one for each microchannel and for the feeder channel, the liquid channel being covered by a thin film of material or several materials;

an upper support plate having an upper face and a lower face in use;

a plurality of tubes mounted in the plate and projecting proud of the faces, each tube proud of the upper face being for connection to one of the transfer conduits and at its other end for connection to one of the ports and wells;

releasable connection means for each port and well for reception of removable separate enclosed transfer conduits for releasable fluidic connection of some of the ports to other of the ports and wells.

63. (New) The biochip assembly as claimed in claim 62, in which the releasable connection means comprises:

a pair of spaced-apart columns proud of the biochip sheet and mounting a pivot bar therebetween; and

a support member pivotally mounted on the bar and having a channel-shaped elongate open mounted slot for reception of the plate, portion of the support member forming a camming surface for engaging the top face of the biochip sheet when pivoted into a position to engage the plate above the biochip sheet.

64. (New) The biochip assembly as claimed in claim 62, in which when the biochips each have additional inlet ports and there are additional sets of main liquid feeder channels, the number of such sets equals the number of additional inlet portions for each biochip.

65. (New) The biochip assembly as claimed in claim 62, in which the inlet ports and outlet ports on the top face have bores between entrance and exit, of substantially constant

cross-sectional area and of substantially the same order of magnitude as that of the microchannels.

66. (New) A biochip assembly for a cell based assay comprising:

a plurality of biochips, each biochip comprising at least one elongate microchannel, an inlet port adjacent one end of each microchannel and an outlet port adjacent the other end of each microchannel;

a liquid delivery unit having a liquid delivery port for connection to each biochip, the liquid delivery unit further comprising a liquid outlet link assembly to provide a steady liquid delivery output rate below 10μl per minute through the liquid delivery port of the liquid delivery unit from a link input port connected to a positive displacement pump forming part of the liquid delivery unit and having an immediate step pumping rate substantially greater than the desired steady liquid delivery output rate, the liquid outlet link assembly further comprising a hollow link body having a resistance to flow therethrough substantially less than through the liquid delivery port and pressure stabilizing means for the link body formed by pressure compressible means connected thereto whereby, on increased pressure being encountered in the hollow link body on operation of the positive displacement pump, the pressure compressible means initially contracts to counteract the pressure rise in the liquid outlet link assembly and hence the rise in the liquid flow rate through the liquid delivery port and then as delivery of liquid takes place through the liquid delivery port the pressure compressible means expands to maintain the pressure within the liquid link assembly relatively stable;

at least one fluidly separate reservoir well for use with each biochip; and

a plurality of removable separate enclosed transfer conduits for releasable fluidic connection of some of the ports to other of the ports and wells.

67. (New) The biochip assembly as claimed in claim 66, in which the pressure compressible means comprises a gas bubble.

68. (New) The biochip assembly as claimed in claim 66, in which the compressible means comprises more than one gas bubble and the aggregate volume of the bubbles is a multiple of the volume of liquid dispensed in one step of the pump.

69. (New) The biochip assembly as claimed in claim 66, in which the compressible means comprises an elastic membrane forming part of the link body.

70. (New) The biochip assembly as claimed in claim 66, in which the link body comprises expandable tubing which forms the expansion means.

71. (New) The biochip assembly as claimed in claim 66, in which control means is provided and is connected to a flow conditions sensing means for the liquid outlet link assembly for causing the pump to operate to provide the desired flow rate through the outlet port.

72. (New) The cell based assay assembly comprising a biochip assembly as claimed in claim 66 and detection and recording equipment for conducting an assay on a biological cell as it is delivered through the biochip assembly.

73. (New) The cell based assay assembly as claimed in claim 72, in which the detection and recording equipment comprises an optically inverted microscope, a digital camera and computerized recording, monitoring and control means.

74. (New) The cell based assay assembly as claimed in claim 72, in which the detection and recording equipment comprises an epifluorescence device.

75. (New) A biochip assembly for a cell based assay comprising:

a plurality of biochips, each biochip comprising at least one elongate microchannel, an inlet port adjacent one end of each microchannel and an outlet port adjacent the other end of each microchannel;

a liquid delivery unit having a liquid delivery port for connection to each biochip, the liquid delivery unit further comprising a liquid outlet link assembly to provide a steady liquid delivery output rate below 10μl per minute through the liquid delivery port of the liquid delivery unit from a link input port connected to a positive displacement pump forming part of the liquid delivery unit and having an immediate step pumping rate substantially greater than the desired steady liquid delivery output rate, the liquid outlet link assembly further comprising a hollow link body having a resistance to flow therethrough substantially less than through the

liquid delivery port and pressure stabilizing means for the link body formed by pressure compressible means connected thereto whereby, on increased pressure being encountered in the hollow link body on operation of the positive displacement pump, the pressure compressible means initially contracts to counteract the pressure rise in the liquid outlet link assembly and hence the rise in the liquid flow rate through the liquid delivery port and then as delivery of liquid takes place through the liquid delivery port the pressure compressible means expands to maintain the pressure within the liquid link assembly relatively constant;

at least one fluidly separate reservoir well for use with each biochip; and

a plurality of removable separate enclosed transfer conduits for releasable fluidic connection of some of the ports to other of the ports and wells, each transfer conduit having an internal cross sectional area substantially greater than that of each microchannel.

76. (New) A biochip assembly for a cell based assay comprising:

a plurality of biochips, each biochip comprising an elongate microchannel;

an inlet port adjacent one end of each microchannel;

an outlet port adjacent the other end of each microchannel;

a liquid delivery unit having a liquid delivery port for connection to each biochip, the liquid delivery unit further comprising a liquid outlet link assembly to provide a steady liquid delivery output rate below 10μl per minute through the liquid delivery port of the liquid delivery unit from a link input port connected to a positive displacement pump forming part of the liquid delivery unit and having an immediate step pumping rate substantially greater than the desired steady liquid delivery output rate, the liquid outlet link assembly further comprising

a hollow link body having a resistance to flow therethrough substantially less than through the liquid delivery port and pressure stabilizing means for the link body formed by pressure compressible means connected thereto whereby, on increased pressure being encountered in the hollow link body on operation of the positive displacement pump, the pressure compressible means initially contracts to counteract the pressure rise in the liquid outlet link assembly and hence the rise in the liquid flow rate through the liquid delivery port and then as delivery of liquid takes place through the liquid delivery port the pressure compressible means expands to maintain the pressure within the liquid link assembly relatively constant;

at least one fluidly separate reservoir well for use with each biochip; and

releasable connection means for each port and well for reception of removable separate enclosed transfer conduits for releasable fluidic connection of some of the ports to other of the ports and wells.

77. (New) A biochip assembly for a cell based assay comprising:

a plurality of biochips, each biochip comprising an elongate microchannel, an inlet port adjacent one end of each microchannel and an outlet port adjacent the other end of each microchannel;

a liquid delivery unit having at least one liquid delivery port, the liquid delivery unit further comprising a liquid outlet link assembly to provide a steady liquid delivery output rate below 10μl per minute through the liquid delivery port of the liquid delivery unit from a link input port connected to a positive displacement pump forming part of the liquid delivery unit and having an immediate step pumping rate substantially greater than the desired steady liquid

delivery output rate, the liquid outlet link assembly further comprising a hollow link body having a resistance to flow therethrough substantially less than through the liquid delivery port and pressure stabilizing means for the link body formed by pressure compressible means connected thereto whereby, on increased pressure being encountered in the hollow link body on operation of the positive displacement pump, the pressure compressible means initially contracts to counteract the pressure rise in the liquid outlet link assembly and hence the rise in the liquid flow rate through the liquid delivery port and then as delivery of liquid takes place through the liquid delivery port the pressure compressible means expands to maintain the pressure within the liquid link assembly relatively constant;

at least one fluidly separate reservoir well for use with each biochip; and

a plurality of removable separate enclosed transfer conduits for releasable fluidic connection of some of the ports to other of the ports and wells.

78. (New) A biochip assembly for a cell based assay comprising:

a plurality of biochips, each biochip comprising an elongate microchannel, an inlet port adjacent one end of each microchannel and an outlet port adjacent the other end of each microchannel;

a liquid delivery unit having at least one liquid delivery port, the liquid delivery unit further comprising a liquid outlet link assembly to provide a steady liquid delivery output rate below 10µl per minute through the liquid delivery port of the liquid delivery unit from a link input port connected to a positive displacement pump forming part of the liquid delivery unit and having an immediate step pumping rate substantially greater than the desired steady liquid

delivery output rate, the liquid outlet link assembly further comprising a hollow link body having a resistance to flow therethrough substantially less than through the liquid delivery port and pressure stabilizing means for the link body formed by pressure compressible means connected thereto whereby, on increased pressure being encountered in the hollow link body on operation of the positive displacement pump, the pressure compressible means initially contracts to counteract the pressure rise in the liquid outlet link assembly and hence the rise in the liquid flow rate through the liquid delivery port and then as delivery of liquid takes place through the liquid delivery port the pressure compressible means expands to maintain the pressure within the liquid link assembly relatively constant;

at least one fluidly separate reservoir well for use with each biochip; and

a plurality of removable separate enclosed transfer conduits for releasable fluidic connection of some of the ports to other of the ports and wells, each transfer conduit having an internal cross sectional area substantially greater than that of each microchannel.

79. (New) The method of conducting a biological cell assay on a cell based assay assembly as claimed in claim 49, comprising the steps of:

(a) connecting the liquid delivery outlet port to a well by a transfer conduit;

(b) aspirating liquid from the well into the transfer conduit;

(c) connecting the transfer conduit to an inlet port;

(d) delivering liquid from the transfer conduit through the biochip and then repeating steps (a) to (d) as often as required; and

(e) then carrying out the assay with the detection and recording equipment as the final step (d) is being carried out.

80. (New) The method as claimed in claim 79, in which the additional step, after one or more of step (d), is carried out of simultaneously using another transfer conduit to connect the outlet port of the biochip to another well.

81. (New) The method as claimed in claim 79, in which the additional step is performed of filling the transfer conduit with the system liquid.

82. (New) The method as claimed in claim 79, in which the additional step is performed of replacing the transfer conduit between aspirating liquids from wells during steps (a)-(d) in order to avoid cross-contamination.

83. (New) The method as claimed in claim 79, in which, after aspirating liquid from a well, the additional step of flushing system liquid through the transfer conduit is carried out.

84. (New) The method as claimed in claim 79, in which a desired flow rate (Q_1) within the biochip assembly is achieved by:

determining the required pressure (P_1) within the liquid delivery unit to achieve the desired flow rate (Q_1) by first determining a steady flow rate ($Q_{plunger}$) for the pump which maintains a constant pressure (P) within the biochip assembly to provide a fluidic resistance

factor (R_f) for each biochip determined by dividing the pressure (P) by the flow rate ($Q_{plunger}$) and then multiplying the desired flow rate (Q_1) by this fluidic resistance factor (R_f) to provide the required pressure (P_1); and

then operating the pump to provide the required pressure (P_1).

85. (New) The method as claimed in claim 79, in which a desired flow rate (Q_1) within the biochip assembly is achieved by:

determining the required pressure (P_1) within the liquid delivery unit to achieve the desired flow rate (Q_1) by first determining a constant pressure (P) which maintains a steady flow rate ($Q_{plunger}$) for the pump within the biochip assembly to provide a fluidic resistance factor (R_f) for each biochip determined by dividing the pressure (P) by the flow rate ($Q_{plunger}$) and then multiplying the desired flow rate (Q_1) by this fluidic resistance factor (R_f) to provide the required pressure (P_1); and

then operating the pump to provide the required pressure (P_1).

86. (New) The method as claimed in claim 84 or 85, in which when the pressure drops below the required pressure (P_1) by a predetermined amount, the pump is operated to deliver liquid into the liquid delivery unit and when the required pressure is exceeded by a predetermined amount, the pump is reversed to aspirate liquid.

87. (New) The method as claimed in claim 84 or 85, in which the flow rate of the pump is varied to maintain the pressure within a predetermined range of pressure.

88. (New) The method as claimed in claim 84 or 85, in which the required pressure (P_1) is achieved with the predetermined displacement volume (ΔV) of the pump over a predetermined time by varying the compressibility of the pressure compressible means.

89. (New) The method as claimed in claim 88, in which the varying of the compressibility of the pressure compressible means comprises adding or reducing the amount of gas within the link body.